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ABSTRACT

Arguing that retention research requires a sound theoretical framework and that retention planning takes place within a sociopolitical context, this paper presents an overview of the requirements and process of student retention research. Part I examines the role of research in a college's retention effort and establishes the general requirements of retention research. Part II examines the sociological models of student departure developed by Spady, Tinto, and Pascarella, and discusses the longitudinal and interactive aspects of academic persistence. Part III discusses student and institutional variables relevant to the study of student attrition, including student satisfaction, peer group relations, and out-of-class interaction between students and faculty. This section also identifies four categories of students exhibiting different types of persistence behavior; i.e., persisters, stopouts, dropouts, and attainers. After part IV describes sources of data and means of collecting and analyzing them, part V discusses the development of a computerized student tracking system. It presents a database design that accomodates student flow, cohort tracking files, computer capacity, data manageability, and system outputs. The concluding section discusses sociopolitical considerations in the development of retention research and the ways in which the interactive dynamics among elements of the institution can constrain research efforts. (AAC)

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STUDYING STUDENT RETENTION: THE REQUIREMENTS AND PROCESS OF RETENTION RESEARCH

Paul Hisada

A Working Paper Prepared In Conjunction With The
University of Hawai`i Community Colleges
Native Hawaiian Vocational Education Project
August 1988

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Studying Retention: The Process and Requirements of Retention Research

Organization of the Paper: Statement of Purpose

This paper reviews the requirements and process of retention research. Its major premise is that the nature of persistence -- its longitudinality, and the complex interaction of student and institutional variables involved in its process -- require the researcher to act within a sound theoretical framework and employ tools appropriate for the collection, management and analysis of data in retention research. The structure of the institutional community furthermore imposes certain constraints upon the development of retention programs, including the research component. A second premise is that a development process which recognizes the sociopolitical constraints involved in program development at the institutional level is necessary.

The paper first examines the role of research in a general retention effort. Second are examined various models of student departure which provide a general context within which to develop research. The longitudinal and interactive nature of persistence is discussed in this context. Third, based on the theoretical models, student and institutional variables relevant to retention research are identified. Fourth, sources of data and means of data collection are discussed. Fifth, the development of a computerized system for data management and the conduct of retention research is described. In conclusion, the sociopolitical requirements of developing retention programs, especially retention research, are discussed.

Introduction

Student ability to persist and institutional ability to retain students have become topics of serious concern in higher education, especially in the past decade which is marked by a decline in traditional age college students.

Institutions are concerned not only to curtail losses in revenue due to attrition, but are more importantly concerned that students develop and succeed. Diversification of student clientele to include adult learners, minorities, the disabled, internationals and commuters has also occurred.

This diversification raises the issue of student-institution fit, as most institutions founded prior to the 60s and 70s were designed for the male caucasian aged 18-22 years. In order to adapt to the needs of changing student clientele and to encourage persistence among all students, institutions have been forced to know their students in greater detail and conduct self-assessment in the areas of recruitment and admission, student and academic services and overall institutional organization and environment. Retention research is an important component of institutional assessment.

Retention programs have two basic components: a research component and an interventions component. The research component serves the primary purpose of describing the dynamics of student persistence or withdrawal at a particular institution. It enables the institution to assess student and institutional characteristics in terms of their effect upon persistence, thus giving the institution an indication of how best to plan for changes that will increase retention.

I. The Role of Retention Research

Tinto (1987) states that retention research addresses two primary issues: 1) identification of the types of attrition occurring in the institution and their relative frequency among the general student population and its subpopulations (description) and 2) identification of the events that lead to the various types of attrition (explanation).

Levitz and Noel (1985) divide retention research into three phases: 1)

analysis of student enrollment behavior, 2) assessment of the multidimensional interactions that occur between students and the college environment and 3) evaluation of outcomes -- program effectiveness and/or intervention impact. They stress that retention research be used for more than description and explanation to do the following:

1. Identify the scope and dimensions of the attrition/retention situation on campus.
2. Provide baseline data against which gains can be measured.
3. Identify those areas of the institution that are functioning well and those areas that are not functioning as intended.
4. Guide action to institute changes where necessary.
5. Determine effectiveness after changes have been made and validate claims.[1]

The results of retention research can be used in the development of retention interventions, such as early warning systems, once attrition-prone students have been identified, and in the development of long term policies leading to institutional change. Research results can also be used to make a case for initiating retention efforts and diffusing awareness of attrition problems throughout the institution (Noel, Levitz, Saluri 1985).

The second major component, which is based on the outcomes of the first, is design and implementation of retention strategies. These strategies are usually employed in the areas of admissions, orientation, financial aid, student services, counseling (and academic advising) and student life. Enhancement of the physical environment, for example in the provision of meeting places for students, is also a retention strategy. Strategies are best developed on the basis of findings in the research component. Specifically, they might include exit interviews, peer programs, early-warning systems, dropout studies, faculty-staff development, cocurricular activities and curricular developments (Beal and

Noel 1980).

General Requirements of Retention Research

Most institutions have the capability to determine whether or not they have a retention problem, which requires the capability to conduct a descriptive study to determine what percentage of new entrants for a given term persist to enrollment in subsequent terms and/or to program completion and graduation by the end of a specified time period. However, once the determination has been made, further research into the various types and causes of attrition at a particular institution requires the following information:

1) Knowledge of student characteristics, including goals, commitment and interactive experiences with the higher education environment, and how they impact persistence.
2) Institutional self-knowledge, including the details of student flow into and out of the institution.
3) An appropriate research design and analytical procedure.
4) A capability to collect, organize and manipulate data for the conduct of retention research.

In order to meet these requirements in a logically consistent or systematic manner, it is expedient to develop or adopt a theoretical or conceptual framework to guide the development process. This will indicate which student and institutional characteristics are likely to impact persistence (requirements 1 and 2). A program which outlines a process for collection and analysis of data and application of the results should also be formulated (requirement 3). Theoretical models provide insight into the nature of the persistence process and thus indicate the appropriate research design and analytical procedures. Institutions must develop instruments and devices with which to collect and store data (requirement 4). For most institutions, this involves development of computer hardware, databases, database management and analysis software and data collection instruments. In addition, research development should take place in

a carefully planned sociopolitical process designed to involve campus constituents and mobilize resources toward a general retention program.

II. Models of Student Departure

Institutional change directed toward increasing retention is best planned using an information base developed within a sound theoretical framework and derived through the use of valid and reliable collection and analysis procedures. The research which supports this information base should therefore be carefully planned.

A preliminary step in planning retention research is development or adoption of a theoretical framework, usually a theoretical model of student departure. These models identify student and institutional variables with possible impact on persistence. Variables include general student demographics, institutional characteristics and indicators of student-institution interaction. The usefulness of a theoretical framework for attrition research has been described by John P. Bean:

> A theory of student attrition describes the attrition process -- it explains why students drop out of school. In another way, a theory of student attrition can be used to predict which students are most likely to drop out of school. Theory guides research. It tells us what variables or constructs we should focus on in a study and how those variables are related to what we are trying to explain. It also helps us by eliminating variables that cannot be deduced from the theory.[2]

Various models of student departure have been developed drawing from psychological, sociological, economic and organizational theory (Tinto 1986). Psychological models explain student departure in terms of student personal and intellectual characteristics which determine student ability to successfully meet the social and academic challenges of higher education. Sociological and economic models interpret withdrawal behavior as influenced by forces external

to both student and institution, such as social conflict, structure and function and economic factors. Organizational models focus on the characteristics of various types of institutions related to persistence.

The weakness of these models is that they explain departure within contexts independent of one another without reference to the possible combined or interactive effect of student, institutional and extra-institutional factors on persistence. A theoretical framework for the development of a process for retention research, however, should provide flexibility to the research process in terms of comprehensiveness of variables possibly affecting persistence. A framework encompassing a wide range of personal and institutional factors and their interaction is more likely to result in an accurate assessment of the causes underlying attrition.

Three Models of Student Departure

The models described below attempt to explain the phenomenon of student departure. The models selected are just a few among the many developed over the years, but are derived from syntheses of past theory and research and therefore comprehend the major postulates and constructs of earlier efforts. The most important of these postulates are that persistence is an interactive, longitudinal process. For these reasons, special attention is given to the work of Spady (1970), Tinto (1975, 1987) and Pascarella (1980).

The models are not constructed from theories developed within the field of education to explain attrition in institutions of higher education. The general theoretical postulate of Durkheim's (1961) sociological theory of suicide, for example, was used by Spady as a context to develop a synthetic model of persistence. Tinto expanded upon Spady's work and Pascarella applied Tinto's work in his own research.

Spady

Drawing from Durkheim's theory that shared group values (normative congruence) and friendship support will reduce the incidence of suicide, Spady (1970) constructed a descriptive model of student departure postulating that grade performance, normative congruence and friendship support lead to increased integration into the academic and social environment of higher education institutions (Figure 1). Based upon an extensive review of the retention literature, Spady formulated this basic assumption:

> ... the dropout process is best explained by an interdisciplinary approach involving an interaction between the individual student and his particular college environment in which his attributes (i.e., dispositions, interests, attitudes, and skills) are exposed to influences, expectations, and demands from a variety of sources (including courses, faculty members, administrators, and peers). The interaction that results provides the student with the opportunity of assimilating successfully into both the academic and social systems of the college. To the extent that the rewards available within either system appear insufficient, however, the student may decide to withdraw.[3]

The decision to withdraw is influenced by two factors basic to the academic and social systems. In the academic system, grades and intellectual development exert the major influence. In the social system, normative congruence and friendship support are the deciding factors. Spady also incorporates family and cultural background into the model.

The significance of Spady's work lies in 1) the linkage of decision to persist to a longitudinal process, 2) the identification of background characteristics as important to the withdrawal process and 3) the identification of normative congruence and peer support as important variables in the process, in addition to grade performance and intellectual development (Bean, 1982).

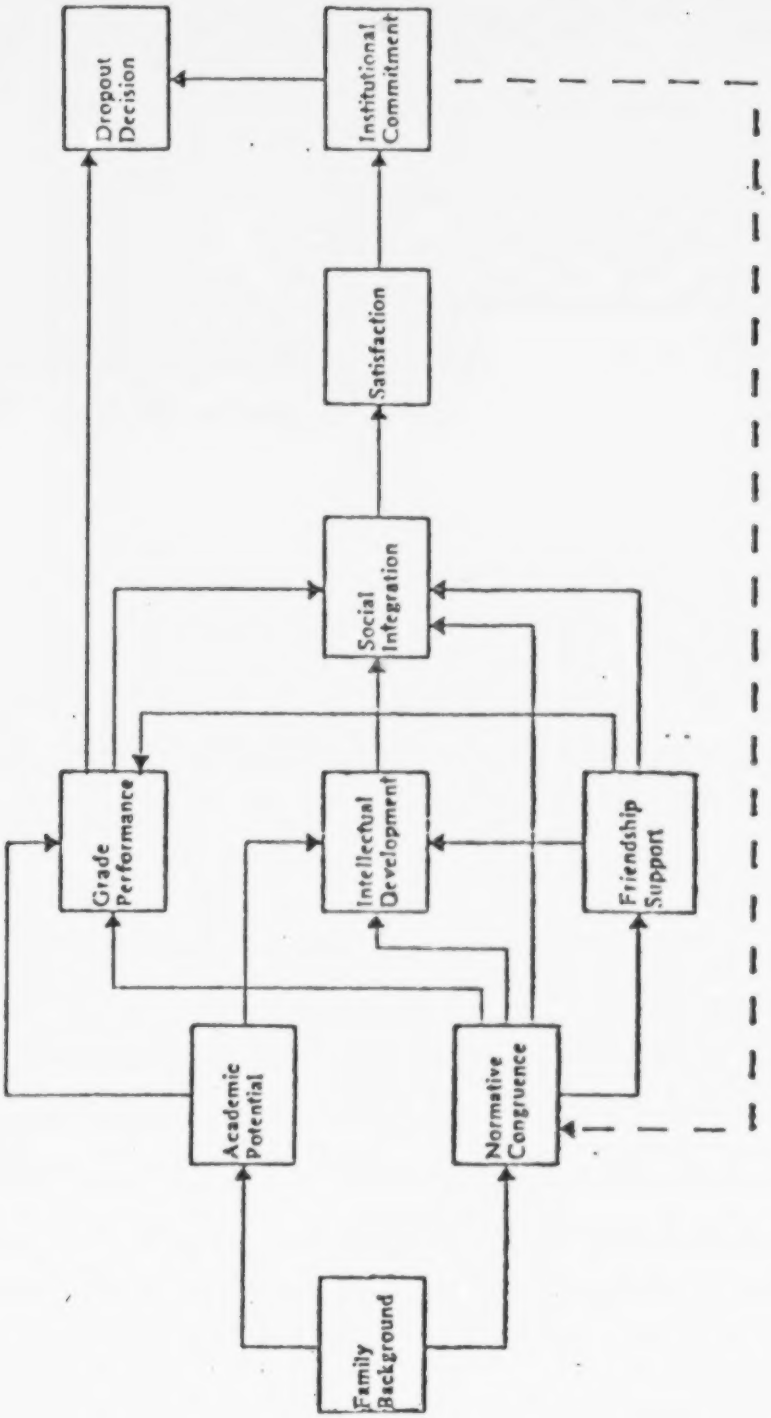

Figure 1: An Explanatory Sociological Model of the Dropout Process

Source: Spady, W. "Dropouts From Higher Education: An Interdisciplinary Review and Synthesis" in Interchange, V. I, p. 79.

Tinto

A synthetic predictive model based on existing theory and empirical research was developed by Tinto (1975, 1987). Drawing from Spady's work, Tinto's model postulates that background experience, including family background, personal characteristics and preparatory education interact with each other and influence commitment to the goal of graduation and commitment to the institution (Figure 2). Tinto expands upon Spady's work with the inclusion of motivational and commitment variables:

> ... if one wishes to develop a theoretical model of dropout from college, one which seeks to explain the longitudinal process of interactions that lead differing persons to varying forms of persistence and/or dropout behavior, one must build into the model sets of individual characteristics and dispositions relevant to educational persistence. To do this, it is suggested here that one must include not only background characteristics of individuals ..., but also expectational and motivational attributes of individuals (such as those measured by career and educational expectations and levels of motivation for academic achievement). With specific reference to dropout from higher education, one would need to know the individuals' educational expectations and their institutional manifestations, if any.[4]

Tinto defines educational expectations in terms of educational goal commitment (psychological orientations which predict the manner in which students interact in the college environment) and institutional commitment (involves the dispositional, financial and time commitments students make in attending a specific institution or type of institution) which are associated with integration into the academic and social systems of an institution. Commitment to educational objective and commitment to the institution both increase the likelihood of persistence. Goal commitment leads to better grade performance and thus to academic integration. This integration in turn increases goal commitment. In the social environment, institutional commitment fosters

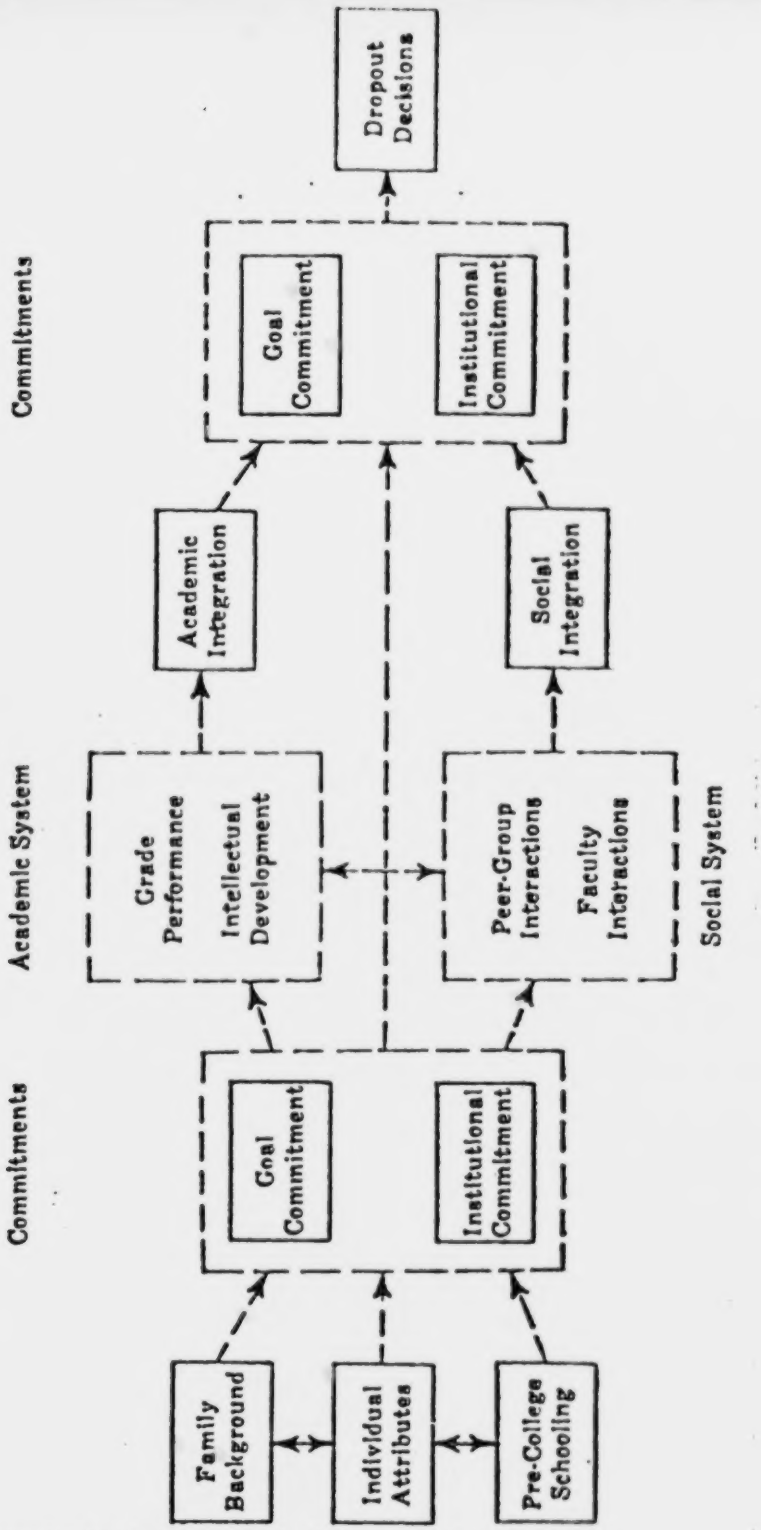

Figure 2: A Conceptual Schema for Dropout from College

Source: Tinto, Vincent. "Dropout From Higher Education: A Theoretical Synthesis of Recent Research" in Review of Educational Research V. 45, No. 1, 1975, p. 95.

peer and faculty interaction, thus increasing institutional commitment and reducing attrition. "In the final analysis, it is the interplay between the individual's commitment to the goal of college completion and his commitment to the institution that determines whether or not the individual decides to drop out from college and the forms of dropout behavior the individual adopts."[5]

The model describes persistence as a longitudinal process in which prematriculation commitments undergo change due to student experience, the outcome of which determines withdrawal behavior. The major constructs of the model are background variables including family background, individual attributes and pre-college schooling; initial commitments, including goal and institutional commitment; system variables, including grade performance and intellectual development (academic system) and peer-group and faculty interactions (social system); goal and institutional commitments subsequent to system integration; and, finally, withdrawal behavior in terms of persistence or attrition. The validity and predictive power of Tinto's model have been established in empirical research in the context of four year (Terenzini and Pascarella 1983), commuter (Pascarella, Duby, Iverson 1983, Allen 1986) and two year institutions (Pascarella, Smart, Ethington 1986, Voorhees 1987). While the validity of Tinto's model has been established across institutional types, the variables having the greatest influence on persistence vary with type of institution. In a two-year, commuter setting, for example, educational goal commitment was found to have a somewhat stronger direct effect than institutional commitment compared to four year residential or commuter institutions (Pascarella and Chapman 1983).

Pascarella

Drawing heavily from Spady and Tinto, Pascarella (1980) developed a model which postulates that the interaction of background characteristics such as

family background, aptitudes, aspirations, goals, values, secondary school achievement, etc. with institutional characteristics such as size, image, administrative policies and decisions, admissions and academic standards, influences the frequency and quality of informal student-faculty contact and other experiences and educational outcomes (Figure 3).

College experiences involve peer culture, classes, extracurricular and leisure activities. Educational outcomes include academic performance, intellectual and personal development, educational and career aspirations, college satisfaction and institutional integration. Educational outcomes are expected to exert the greatest influence on persistence. Informal contact, college experience and educational outcomes act interdependently to mold withdrawal behavior. Pascarella concludes:

> ... what transpires between students and faculty outside of class may have a measurable, and possibly unique, positive impact on various facets of individual development during college. Clearly, such evidence underscores the potential importance of individual faculty members as informal agents of socialization during the student's college experience. It also suggests that an increased understanding of college impact might be gained from inquiry focusing on the nature of student-faculty interaction beyond the classroom as well as in it.[6]

These models postulate the correlation of certain student and institutional variables to persistence. However, empirical tests of the models, in addition to confirming their validity, also indicate disparate results across institutions (Pascarella 1986). Models should therefore serve only as a general framework in the development of retention research, and applied in the context of issues or conditions specific to the institution.

The Longitudinal Aspect of Persistence

Spady, Tinto and Pascarella identified persistence as a longitudinal

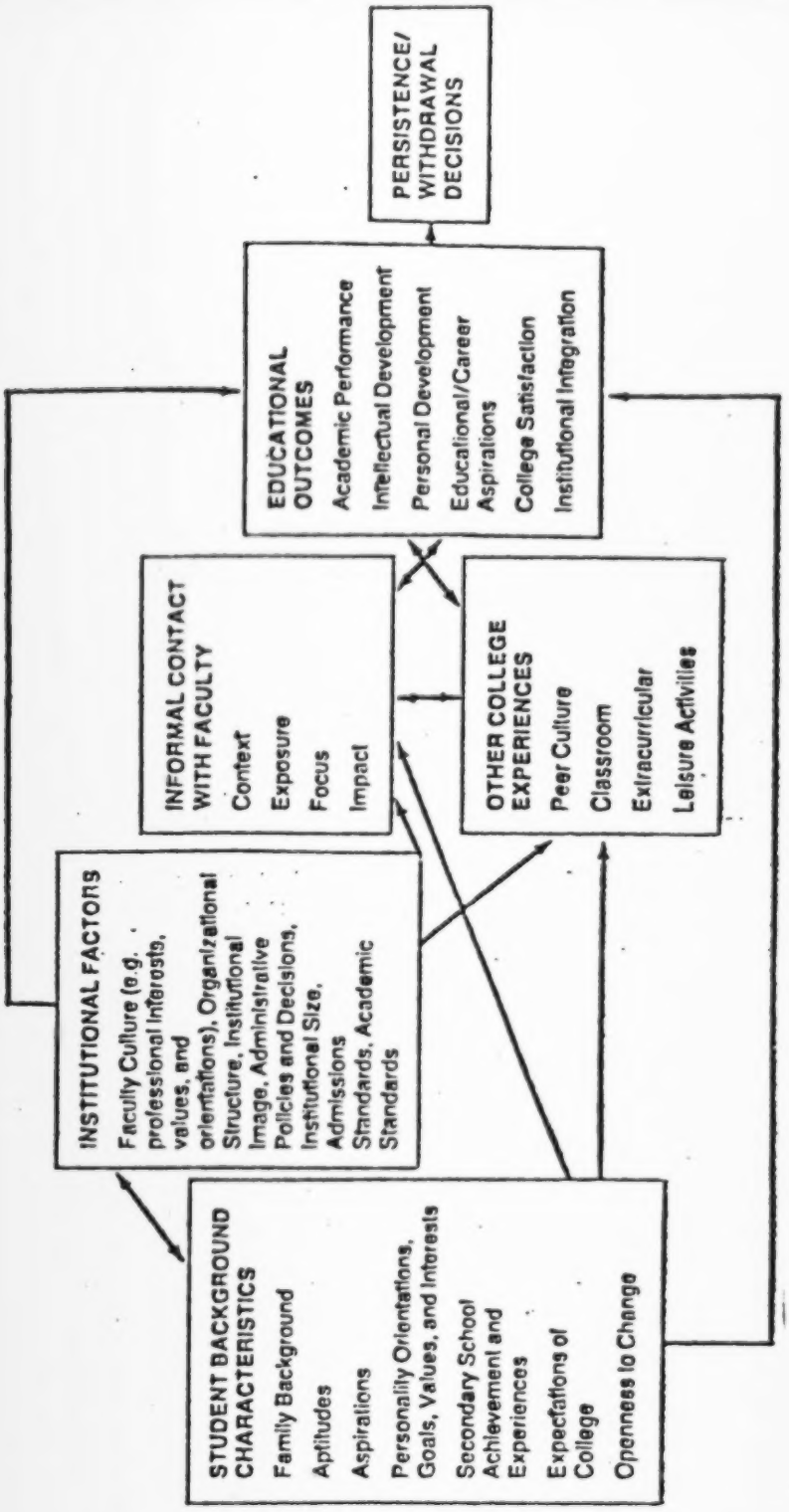

Figure 3: Conceptual Model for Research on Student-Faculty Informal Contact

Source: Pascarella, Ernest T., "Student-Faculty Informal Contact and College Outcomes" in Review of Educational Research V. 50, 1980, p. 569.

process. The central concept is one of change over time, particularly the changes in student prematriculation characteristics which occur during student interaction with the institutional environment. These changes or "outcomes" influence the decision whether or not to persist, itself an outcome. In a further elaboration of his earlier work, Tinto compares the student career to the three staged longitudinal process developed by the Dutch anthropologist Arnold Van Gennep to describe the rites of membership in tribal societies.

The longitudinal process of persistence in this context consists of the stages of separation from membership in past communities (high school and place of residence), transition to college (adjustment to the social and academic life of the institution) and incorporation into the academic and social systems of the college (Tinto 1986). From the perspective of student flow, various student enrollment behaviors are viewed as the outcome of a longitudinal process beginning with a student being identified as a member of a defined recruitment population and ending with withdrawal or program completion (Ewell 1987).

The Interactive Aspect of Persistence

In addition to its longitudinal nature, the persistence process is interactive. The decision to drop out cannot be pinned to a single causal process applicable to all students in all institutions. The decision results from a complex cycle of interdependent events and experiences (e.g., aspiration, aptitude, socioeconomics, institutional environment), the specifics of which vary from institution to institution. The main interaction, in general terms, is between student and institutional community. The main effect of the interaction which has bearing on retention is student integration into the campus community. Tinto has recently compared institutions of higher education to other communities (Tinto 1987) and equates departure from the institution to the leaving which

occurs in other human communities:

> In both instances, departure mirrors the absence of social and intellectual integration into the mainstream of community life and the social support such integration provides. An institution's capacity to retain students is directly related to its ability to reach out and make contact with students and integrate them into the social and intellectual fabric of institutional life. It hinges on the establishment of a healthy, caring environment which enables individuals to find a niche in the social and intellectual communities of the institution.[7]

The persistence process is complex, especially in regard to student-institution interaction, as evidenced by the number of correlates of attrition identified in the research. The process encompasses the total institutional environment, including its major constituents. Tinto states that "in the interactive system of a college, almost any institutional action, whether in admissions, counseling, advising, academic programs, or student life will eventually affect student persistence and will do so in often unintended and quite unexpected ways."[8]

III. Variables Relevant to the Study of Student Attrition

The above models of student attrition indicate that both student and institutional characteristics and their interaction are to be addressed in retention research. Thus three types of variables should be examined: 1) those pertaining to the student, including demographics and student outcomes; 2) institutional variables and 3) interaction variables (student-institution interactions). Tinto (1975) classifies these variables into five categories: 1) background variables (personal and academic), 2) variables related to initial goal and institutional commitment, 3) variables related to academic and social integration, 4) variables related to subsequent goal and institutional commitment and 5) variables describing persistence/withdrawal behavior (attrition,

retention).

Based on syntheses of retention research, Lenning (1982) compiled a list of variables relevant to attrition research and explained their significance (Table 1). He divides them into the categories of student demographic variables, student academic factors, initial student aspirational and motivational variables, student personality and value variables, institutional variables and interaction variables.

Demographic variables do not predict attrition in and of themselves, but may have a bearing on the attrition of student subgroups, especially nontraditional students such as adult students (age), the disadvantaged (socioeconomic status), ethnic minorities (ethnic background), married students (marital status) and commuters (hometown location). Academic variables are those which automatically come to mind when considering reasons for student attrition. Deficiencies related to the above academic factors are typically associated with attrition-prone students (Cope and Hannah 1975).

Research of the influence of initial student aspiration and motivational variables in decision to withdraw is also vital to retention research. This refers directly to the work of Spady and Tinto in regard to goal and institutional commitment. Student personality and values variables are especially important in assessing student-institution fit. Lenning stresses that where a conflict of value and orientation between student and institution takes place, students are more likely to withdraw.

Table 1: Variables Relevant to the Study of Retention

Student Variables:

Demographic: Age, sex, socioeconomic status, ethnic background, marital status, hometown location/size.

Academic: Aptitude test scores, high school achievement, study habits and attitudes, high school attended, subjects/number of courses taken in high school, college program, college grades.

Aspirational: Degree aspiration, termination/completion plans, commitment to college, vocational/occupational goals, familial aspirations.

Personality: Maturity, responsibility, independence, autonomy, intellectual orientation, creativity, self concept, anxiety, assertiveness, value orientation, concern about finance, expressed need for counseling.

Institutional Variables:

Prestige.
Size.
Control (public/private).
Student services.
Selectivity.
Type (two-year, four-year, single sex, coed).
Housing.
Affiliation (religious, military).
Institutional mission.

Interaction Variables:

Student satisfaction.
Social interaction/peer group relations.
Family-college relationship.
Out of class student-faculty interaction.
Faculty concern for students and teaching.
Institutionally generated student development.
Commitment to college and graduation.
Extracurricular involvement.
Responsiveness to student complaints and expressed needs.
Student expectations vs. realities of college life.
Academic program involvement and success.
Learning preferences and teaching method congruence.
Compatibility between student and institutional values.
Student body characteristics.
Student participation in student services.
Student ability and college demands.
Comfort of environment for the student.

Adapted from Lenning, Oscar T. "Variable Selection and Measurement Concerns" in New Directions for Institutional Research: Studying Student Attrition, No. 36. San Francisco: Jossey-Bass, December 1982.

Further Considerations in Variable Selection

The concept of departure from higher education has evolved over the years to include a number of student and persistence typologies which may serve as delimiting parameters to retention research. Research has identified four categories of students exhibiting different types of persistence behavior. Terenzini (1987) describes them as follows:

1. Persister: A person who is continuously enrolled (for the period of time under study). In certificate or degree-completion studies, this individual graduates "on time".
2. Stopout: A student who leaves for a period of time, but who subsequently returns to continue study. This student graduates eventually.
3. Dropout: A student who leaves and does not return during the period under study. (This student, of course, may subsequently prove to be a stopout).
4. Attainer: A student who leaves prior to certificate or degree completion, but after achieving a personal goal (for example, completion of a particular course, or acquisition of a particular skill).[9]

Terenzini also identifies three types of attrition: 1) internal attrition resulting from known interinstitutional transfer; 2) institutional attrition, causes unknown but probably to attend another institution and 3) systemic attrition in which students withdraw from higher education altogether.

The implication of these typologies for research is that different causal variables are operant in the decision to dropout depending upon student intent and aspiration. In addition, the dependent variable of attrition studied may vary with institutional type and characteristics. Community colleges, for example may be more interested than four year institutions in analyzing stopout behavior. Independent student variables studied may depend upon the characteristics of the majority student population. Institutions with a racially homogenous population may be more interested in the relationship between sex and retention than between race and retention. Variable selection should reflect

institution-specific research objectives.

IV. Sources of Data and Means of Collecting Data

Retention Database

Institutions will generally have access to data on the above student variables, especially the basic demographic and academic variables. Data sources are admissions and registration files (enrollment database). Limited data on other variables may also be obtained from financial aid and counseling offices. However, student outcomes data is usually not found in enrollment databases, as it simply is not collected. The most effective means of collecting this data is by means of the student outcomes questionnaire.

Demographic and academic data extracted from the enrollment database and data extracted from outcomes questionnaires can be combined in a single stand-alone "retention" database. Those institutions which have most student data in computer files will find it a rather straightforward matter to create. Other institutions will find database creation a more labor intensive process if data contained in hard copy format must be manually entered into the computer database. In either case, care should be taken that file structure and the coding of data elements be uniform and consistent (Ewell 1988).

Database content will vary from institution to institution depending upon the specific character of the institution and the type of retention study to be undertaken. A cross-sectional study of a student cohort surveyed at entry in Fall '84 and in Spring '85 undertaken at Gallaudet, for example (Gallaudet 1986), determined that sex, ethnic background, hearing loss, type of high school attended, state of residence, declared major and cumulative GPA were the most important variables in studying retention at that college. This database was supplemented by data from a leaver survey. It is at this point in the

development of retention research programs that a theoretical framework becomes crucial in determining what variables are appropriate for study. In light of longitudinal/interactive models of student departure such as Tinto's, many other variables warrant examination.

Means of Collecting Data

Basic demographic and academic data are routinely collected by admissions and the registrar. Data on student outcomes which would indicate the effect of student-institution interaction must be collected separately. The means currently used to do this is the survey/questionnaire. Institutions may choose to design their own instruments, or may adopt instruments developed by organizations such as the NCHEMS/College Board Student Outcomes Information Service (Ewell 1983). In the latter case, organizations like NCHEMS (National Center for Higher Education Management Systems) provide database and analytical services as well. One advantage to designing instruments in-house is that such instruments can be tailored to address issues considered important to a specific institution (Endo 1985). The major drawback is the cost in time and other resources to design and implement use of the instruments.

Typical instruments used to collect data for attrition research are entering, continuing, leaver/graduate, withdrawing and alumni surveys which solicit student evaluation of their college experience and rating of institutional services. Use of these surveys permits an institution to link departure behavior with other student outcomes such as changes in attitudes, satisfaction and economic status. General demographic and academic data will identify who is withdrawing and outcomes survey data will identify or indicate possible reasons why students withdraw. In addition they indicate what institutional factors influence students to withdraw. Surveys can reveal

patterns of difficulties and dissatisfactions, differences between groups of students in terms of academic and personal goals, differences in perception of and satisfaction with the institution and differences in levels of awareness of, use of and satisfaction with student services (Ewell 1983).

Research Design and Analytical Procedures

An important consideration in conducting retention research is research design. Terenzini identifies three designs that might be applied to retention research: autopsy, cross-sectional and longitudinal (Terenzini 1980, 1987). Table 2 summarizes the major considerations relative to use of each of the three research designs. Autopsy studies are "after the fact" and best employed to obtain information on a single cohort of leavers. These students can be surveyed to answer questions relating to why and under what circumstances they left the institution. The major weakness of this design is that it does not permit controlled comparison with different student cohorts such as entering and continuing students, graduates and alumni. Leaver surveys typically have low response rates.

Cross-sectional designs provide a snapshot of currently enrolled students at a single point in time. After it has been established who among the surveyed cohort has or has not enrolled in subsequent terms, a comparison of continuing and leaver information can be undertaken. A weakness of this design, however, is that the influence of preenrollment aspirational and motivational characteristics cannot be ascertained. This could lead to an institution assuming that the sources of attrition lie within its control when in fact pre-college factors may account for differences in cohort response. The problem of response rate is also associated with cross-sectional studies.

Table 2: Summary Evaluation of Three Designs for Studying Attrition

Considerations	Autopsy	Cross-Sectional	Longitudinal
Research Considerations: Benefits:			
Instrument Reliability[a]	Probably Limited	Possible	Possible
Instrument Validity[a]	Probably Limited	Possible	Possible
Likely Response Rates	15-40%	55-80%	40-60%[b]
Sample Representativeness	Unlikely	More likely	More Likely
Internal Validity			
a) Comparisons w/Nondropouts	No	Yes	Yes
b) Controls for Initial Group Differences	No	Limited[c]	Yes
Analytical Procedures	Descriptive/ Bivariate	Bivariate/ Multivariate	Multivariate
Planning: Costs:			
Needed Training/Experience	Minimal	Moderate/Advanced	Advanced
Time to Complete Study	3-5 Months	6-9 Months	15 Months
Direct Costs	Low	Low/Moderate[d]	Moderate[d]
Planning Needed	Limited	Limited/Moderate	Considerable
Applicability of Data to Other Purposes Moderate/High	None/Limited	Moderate/High	
Data Management Problems and Requirements Moderate/Many	Few	Few/Moderate	

[a]More a measurement than design issue, and more dependent on the training and skill of the researcher(s) than on the design adopted. Included here because of its importance in any research.

[b]Response rates, expressed as proportions of an initial sample, decline with each subsequent data collection.

[c]Assumes that the only precollege information available for study is that typically collected at time of application for admission (e.g., sex, academic aptitude, percentile rank in high school class, but not including educational aspirations or goals, commitment to completing a degree, personality characteristics, etc.).

[d]Costs may be reduced considerably if an institution regularly collects extensive precollege data through such programs as the Cooperative Institutional Research Program (UCLA-ACE sponsored) or the ACT Assessment Program.

Adapted from Terenzini, Patrick T. "An Evaluation of Three Basic Designs for Studying Attrition" in Journal of College Student Personnel, V. 21 No.3, pp. 257-63, May 1980.

Ideally, as the process of persistence is longitudinal, a longitudinal design should be adopted. Compared to autopsy and cross-sectional designs, longitudinal designs permit institutions to mark changes in student attitudes and experience over time, provide greater control over confounding background variables and provide more precise estimates of institutional impact on persistence (Terenzini 1987). Longitudinal research designs also permit the generation of recursive comparative data over the life of several student cohorts, enabling institutions to distinguish between the long term forces and processes influencing persistence from short term forces (Tinto 1987).

Terenzini (1987) also examines three types of statistical analysis that can be used in retention research. Till the mid 70s, attrition research relied on univariate or bivariate statistical analyses. Univariate analysis yields descriptive information about a group in terms of a single shared trait and bivariate analysis yields a correlational link between two variables. In order to conduct retention research, however, multivariate analyses such as multiple regression, discriminant function and path analysis are appropriate due to the large number of variables thought to be correlates of persistence. Multiple bivariate analyses could be used; however, this would require repeated testing of paired variables, which increases the likelihood of incorrectly rejecting a null hypothesis.

V. Development of a Computerized Student Tracking System

Given that a longitudinal design is most appropriate for retention research, an institution needs to organize the collection, storage, update and retrieval of data to meet the requirements of longitudinal research. As indicated above, data from an enrollment database and data from outcomes surveys can be combined to form a retention database. The creation of a computerized retention database

is the most practical means of data management and manipulation. Multivariate analyses would be virtually impossible without computers. Institutions with thousands of students and tens of thousands of former students might find it possible to create but impossible to maintain or use a noncomputerized database for retention research. Longitudinal research can be accomplished only through the use of computers due to the sheer quantity of data.

Organization of Data

The most important task after adoption of a theoretical framework, selection of variables, development of collection instruments and choice of research design and analytical procedure is organization of the data for analysis. To conduct a longitudinal study, a particular cohort must be "tracked" over time in order to determine trends and changes in academic performance, attitude, experience and persistence. Simply stated, the retention database must be designed for the efficient storage and retrieval of data for longitudinal analysis. File structure and file content become the major issues in database design.

At the minimum, a source file must be created in which will reside the basic demographic, academic and outcomes data to be used in the study. A cohort file must also be created to contain data on the students selected and which will draw data from the source file(s). For a one-shot cross-sectional or autopsy design, it is possible to work from a source file that is also the cohort file. However, to maintain a capacity to track multiple cohorts and a capacity to selectively access source data as appropriate to varying research objectives, multiple, free-standing source and cohort files are required. Depending upon the number of source files, cohorts to be tracked, and variables for potential analysis, the number of files and file size vary. Finally, a software program for the management of files and analysis of their contents must be developed.

Database Design: A Description of a Longitudinal Tracking System Developed by NCHEMS

NCHEMS designed a retention database and "tracking system" for a consortium of community colleges in Texas (Ewell, Parker and Jones, 1988). The system, in view of the large number of source files and exhaustive array of variables contained in it, may be considered a state of the art tool for the conduct of longitudinal research. A review of its file structure, content and capabilities is warranted.

The NCHEMS "tracking system" consists of a database which uses SPSS-X based tracking software to carry out various file management and analytical routines. The system is designed to track entering student cohorts from term to term and establish cohort attrition and retention rates and to carry out correlational studies of factors related to persistence behavior. NCHEMS recommends as a preliminary step to system implementation that institutions who might employ the system develop a longitudinal model of student flow depicting the flow of various student cohorts into, through and out of the institution. This is consistent with theory as developed by Spady, Tinto and others which defines persistence as a longitudinal process.

Student Flow

The model would depict flow as consisting of a series of enrollment decision points for students and institution at the points of application, admission, registration and subsequent term enrollment. In terms of persistence behavior, term enrollment consists of two possible types of decision points, institutional dismissal and voluntary withdrawal. Decision at each point is therefore either under the control of the student or the institution; e.g., application, registration and voluntary withdrawal are under student control and admission,

graduation and dismissal are under the control of the institution. Further theoretical application to the flow model would hypothesize what student-institutional characteristics and interactions exert positive or negative influence at each decision point. It is recommended that outcomes surveys be administered at these decision points. "Together", states Ewell, "these two types of decision points constitute a complete chain of events that operate in concert, and that determine the enrollment status of a particular group of students at a particular point in time."[10]

A second recommended activity is that institutions objectively describe the student body. In other words, students may be segregated into various subpopulations based upon aggregations of basic characteristics. This could include breakdown by age, sex, ethnicity, high school, GPA and aggregated variables based upon the target population proposed for study. The usefulness of developing a flow model and defining the target population is to provide a means of breaking down the process of enrollment behavior into its various components arranged in a logical sequence and to define the student population in objective, quantifiable terms.

Cohort Tracking Files

A cohort tracking file consists of a longitudinal enrollment record for each student in the cohort. The enrollment record consists of 1) fixed data elements for basic demographic and background information; 2) variable elements for enrollment status, beginning of term and end of term updates 3) semi-fixed elements whose values rarely change, including demographic factors such as marital, residence, and employment status and program major and 4) derived elements, such as course completion rates, which are not usually maintained in the tracking system but are generated in analytical reports. In the NCHEMS

system, a student is assigned to a particular cohort based upon the first term of academic history. Further disaggregation of the cohort by certain variables provides subpopulations defined in terms of various personal and academic characteristics. In other words, the tracking cohort consists of all new college entrants for a given term, including a number of specific subpopulations.

Constraints: Computer Capacity and Data Manageability

How many students and student cohorts to track is an issue tied to the computing capability of the institution in terms of capacity and manageability. Decisions therefore should be carefully made as to what students an institution wishes to track and over what terms and what number of terms. A four year institution may wish to track only part time and full time students over a period of ten academic years, while a two year institution may wish to track these students plus students in continuing education, GED, ESL and noncredit students over a period of five academic years.

In similar fashion, the number of variables to track over time is limited by the constraints of computer resources, efficiency and manageability. Variables must therefore be carefully selected for their relevance to the issues to be studied. Theoretical principles of student enrollment behavior, adopted from the existing body of research or developed in-house by the institution can be applied at this point to determine what data is to be collected. In addition, the reporting requirements of various accreditation and assessment agencies will provide further guidelines for database content.

It is helpful to determine prior to the point of variable selection what kinds of information or output will be required of the system by internal/external agents. If not for the resource and technical constraints involved, a database could include thousands of variables and track them for

students of every enrollment type over indefinite periods and generate analyses of every kind. A little planning in the research and development stage is indispensable. Planning should recognize institutional resource limitations and be conducted in a context of need vs. want.

System Outputs

The output of the NCHEMS system consists of institution level progress, performance and remediation reports and state level cohort and remediation reports. This selection of output reflects the issues which the consortium of community colleges in Texas wished to address through the system. A progress report presents persistence rates for various subpopulations and reports status for certain indicators thought to influence retention in the areas of basic demographics, educational background, enrollment status and limited outcomes information such as student objective in attending college and intended duration of enrollment.

A performance report presents status in terms of variables such as number of terms attended, total credit hours earned, average credit load, overall GPA, and percent of cohort members with GPA less than 2.0. Remediation reports present progress in completing remedial requirements for reading, writing and computation. State level cohort progress and remediation reports present the progress and performance of entire cohorts or specific subpopulations for the entire state.

The design of the NCHEMS tracking system reflects the longitudinal and interactive nature of the persistence process in both the organization of data and nature of data included for analysis. The University of Colorado (Endo 1985), Gainesville Junior College (Coker 1985), Gallaudet University (Gallaudet 1986) and many others have developed their own systems to track students. These

tend to be systems set up on an ad hoc basis (except Colorado) to explain perceived retention problems for specific student populations at a specific point in time using cross sectional research designs. The NCHEMS system is proposed as a permanent means of keeping abreast of the ongoing longitudinal process of persistence and trends for any number of cohorts and possible subpopulations. In light of the longitudinal nature of student persistence proposed by theory and research, systems such as NCHEMS best meet the requirements of longitudinal retention research.

Conclusion: Sociopolitical Considerations in the Development of Retention Research

The persistence process, due to its longitudinal nature and the complexity of persistence related variables, imposes a certain number of constraints in the planning of retention research. Aside from the technical requirements it imposes upon researchers, it requires that an institution establish mechanisms that will develop a network of support among various institutional offices. A wide range of offices and individuals are responsible for the administration of activities involving student-institution interaction. Offices maintain transactional records (data) appropriate to the specific function of the office. Due to the wide range and various types of data needed to conduct retention research, interoffice cooperation must be established in order to ensure that complete information is provided. The longitudinal nature of the research also requires that cooperation is maintained, which means that institutional commitment to the process is necessary to provide ongoing support.

Pascarella (1986) points out that the factors affecting student enrollment behavior involve a "broad range of institutional functioning", including instructional quality, residential life, student faculty interaction,

extracurricular activity, and academic advising: "consequently, student retention is more appropriately conceived of as an institutional issue with broad institutional influences and implications. Consistent with this perspective is the need to organize salient constituencies throughout the institution to address the issue of retention."[11]

Lenning (1982) stresses that the political climate of an institution represented by key administrators and faculty affects institutional receptivity to retention research and recommendations. Campus customs, practices, values, personalities and bureaucratic organization should be considered in study design and implementation.

Interactive Dynamics in Higher Education Institutions

The interactive dynamics of the higher education community with probable impact on the development of retention efforts have been identified as 1) a vertical set of relations between system levels: trustees, administrators, faculty, support personnel and students; 2) a horizontal set of relations between departments, peer managers/administrators, peer teachers, student leaders and organizations; 3) relations between elements of the past (traditions, mission statement, reputation), the present (morale, standards, procedures), and the future (goals, perspectives, and so on); and 4) relations between the system and its environment: economic, political, physical factors and others (Smith, Lippitt, Sprandel 1985).

These interrelationships are often colored by factional, competitive interests which make it difficult to initiate necessarily collaborative efforts such as a retention program. Vertical, even horizontal communications are often constrained by rigid protocol, especially in public bureaucracies. Whereas the campus may be described as a community, it is not the case that a "sense" of

community exists. As in developing efforts to address problems in extrainstitutional communities, a factionalized campus community must be "organized" before it can effectively deal with issues affecting the whole community.

How Interactive Dynamics Constrain Retention Research Efforts

The design and implementation of any project may be viewed as a logical process with clear-cut development and implementation requirements. From a technical viewpoint, a retention project, especially its research component, is a systematic process requiring certain inputs and activity to produce a certain output. Planning the research component, for example, would thus appear a straightforward activity which simply involves organization of input/activity.

One would not expect the planning of the research component to take into account sociopolitical as well as technical factors. However, the planning process takes place within the sociopolitical environment of the higher education institution, which imposes constraints upon the acquisition of resources and the mobilization of persons to staff projects. Furthermore, the specifics of what is to be studied in retention research and toward what end further complicate the process as answers to these questions are arrived at in a process which is value/interest based.

For retention research the major inputs are data and the major activity analysis. Collection of data would seem to be an activity with only practical/technical constraints. However, the raw data is usually distributed across the various offices responsible for the administration of institutional activities which impact student persistence, such as admissions, student services, student life, counseling, advising, administration and faculty. These offices maintain transactional records which log the outcomes of formal

interactions between institution and students.

Retention research requires data both from this transactional record and from administrative databases. To gain access to the data and support for the overall project therefore requires the cooperation of the appropriate persons. Given the interactive dynamics described above, this is not a simple task to accomplish. The technical process of developing retention research is embedded in a sociopolitical process.

Given the interactive dynamics of higher education institutions which constrain collaborative efforts in terms of factional interests and formal barriers to communication, retention efforts should employ a planning process which mitigates or neutralizes sociopolitical tensions. The processes for developing retention programs recommended in the literature focus on the community or sociopolitical element.

Developing the Retention Effort: A Sociopolitical Process

A recommended initial step in the research and development of a retention research process is therefore the formation of a campus-wide retention task force or steering committee composed of representatives from among the following constituencies: students, faculty, student and academic services administrators, institutional research, admissions, registration and records and others (Pascarella 1986), (Noel, Levitz, Saluri 1985).

Also required for the initiation of the retention effort is backing from the top levels of institutional management and administration, preferably the president's or chancellor's office (Tinto 1987, Pascarella 1986, Smith, Lippitt, Sprandel 1985). Tinto remarks that sanction from the chief executive and staff fosters commitment at the institutional level:

> However organized, effective retention programs require effective leadership and strong support of

> the head of the institution and his/her top staff. This is the case not only because of the obvious need for institutional support. It also reflects the fact that the effectiveness of retention programs is very much a function of the commitment the institution makes to the goals of student retention. Though the leadership of an institution is not alone in this commitment, without it the task of building effective retention programs is made immeasurably more difficult.[12]

Community organizers face the same difficulties. It is extremely difficult to mobilize a community to address an issue as a community when sizeable constituencies refuse support because their leaders have not sanctioned the effort. Certain constituencies in the higher education community, especially administrators in large bureaucracies, will not support a campus wide retention effort unless sanctioned at the top levels.

Noel, et al (1985) have devised a ten step plan for mobilizing institutions for retention activities. The process is intensely political and sensitive to the sociopolitical constraints described above. Basic to all of these steps is a concern for community-wide participation. These steps are summarized below.

Step one involves creation of an awareness of the benefits (increased academic quality, economic return, etc.) of institutional change that will increase retention. Brainstorming sessions of concerned persons can be used to generate a list of possible benefits. Toward this end, step two involves identification and organization of committed supporters -- those "risk takers" and "early innovators" -- who, in informal or unofficial situations, have indicated a desire to initiate retention activities.

Once initial support has been secured, step three involves broadening the base of support through formation of an ad hoc committee representative of all campus constituents involved in the persistence process (which is practically <u>all</u> constituents). Step four involves assembly of this "start up" committee to

share and review retention data, to brainstorm campus strengths and weaknesses and arrive at a consensus as to the need for a formal, organized retention effort.

Step five involves formalization of the retention effort in the form of an official task force or committee. It is critical at this stage to have the chief executive officer of the institution appoint task force members and to do so in a highly visible manner. This fosters institutional commitment to the retention effort. A retention coordinator is also appointed at this juncture. The main qualities this appointee should possess in addition to credibility is the ability to facilitate a collaborative campuswide effort, which requires knowledge of the sociopolitical dynamics of the institution. Task force appointees should include informal as well as formal leaders.

In step six the formal task force is convened to review the data, determine needs for additional data and plan ways to disseminate information on task force objectives and activities. The task force must maintain visibility and ensure that the flow of information to the institutional community is continuous. Based on the data, retention strategies are developed in this stage.

In step seven, implementation of the strategies formulated in step six is initiated. Two techniques suggested by Noel are 1) the contracting of a known retention expert (an external authority) to provide state of the art information and techniques on retention and 2) the undertaking of collaborative involvement building activities to engage a larger portion of the institutional community in the effort. Those to be involved should include those who are affected by any changes stemming from the effort.

Step eight involves establishing priorities for action. Subcommittees are formed to explore areas requiring immediate attention and to make recommendations

as to possible changes. In step nine, top level support of the proposed changes is sought. This involves presentation of the recommendations developed in the previous step to decision makers. Recommendations should be concrete in terms of impact on student persistence, activities involved in the process, resource requirements and specific outcomes to be achieved. Step ten involves implementation and assessment of the impacts of the proposed retention program.

Concluding Remarks

The nature of the process of student persistence, in particular its longitudinality and the number and complexity of variables which affect it, requires that care be given to the logical structure, selection of variables, data collection and analytical procedures of the research. In addition to the careful planning of the technical aspects of retention research, factors of institutional commitment, organization and mobilization of resources must also be accounted for in the development process.

The level of care with which retention research is planned will directly affect its applicability to the planning of effective retention strategies and will also affect the credibility with which the effort is viewed. Well planned research which acknowledges the efforts of theorists and researchers and the technical requirements of conducting longitudinal studies will produce a base of valid information upon which to plan retention interventions.

Notes

[1] Levitz, Randi and Noel, Lee. "Using a Systematic Approach to Assessing Retention Needs" in Noel, Levitz and Saluri, eds., Increasing Student Retention: Effective Programs and Practices for Reducing the Dropout Rate, pp. 448-467. San Francisco: Jossey-Bass, 1985, p. 351.

[2] Bean, John P. "Conceptual Models of Student Attrition: How Theory Can Help the Institutional Researcher" in E. Pascarella, ed., New Directions for Institutional Research: Studying Student Attrition, no. 36. San Francisco: Jossey-Bass, December 1982, p. 17.

[3] Spady, W. "Dropouts From higher Education: An Interdisciplinary Review and Synthesis" in Interchange, V. I, pp. 64-85, 1970., p. 77.

[4] Tinto, Vincent. "Dropout From Higher Education: A Theoretical Synthesis of Recent Research" in Review of Educational Research, Vol. 45, No. 1, pp. 89-125, 1975, p. 93.

[5] Ibid., p. 96.

[6] Pascarella, Ernest T. "Student-Faculty Informal Contact and College Outcomes" in Review of Educational Research, Vol 50, pp. 545-595, 1980, p. 571.

7 Tinto, Vincent. Leaving College: Rethinking the Causes of College Attrition. Chicago: University of Chicago Press, 1987, p. 180.

8 Ibid., p. 181.

[9] Terenzini, P. T. "Studying Student Attrition and Retention" in Muffo, J. A. and McLaughlin, Gerald W., eds., A Primer on Institutional Research. Tallahassee: Association for Institutional Research (AIR), pp. 20-35, 1987, p. 22.

[10] Ewell, Peter T., Parker, Ronald and Jones, Dennis P. Establishing a Longitudinal Student Tracking System: An Implementation Handbook. Boulder: NCHEMS, 1988, (draft), p. 9.

[11] Pascarella, Ernest T., Smart, John C. and Ethington, Corinna A. "Long Term Persistence of Two-Year College Students" in Research in Higher Education, Vol. 24, No. 1, pp. 47-71. New York: Agathon Press, 1986, p. 101.

[12] Tinto, Vincent. Leaving College: Rethinking the Causes of College Attrition. Chicago: University of Chicago Press, 1987, p. 174.

Bibliographical References

Allen, David F. "Attrition at a Commuter Institution: A Path Analytic Validation of Tinto's Theoretical Model of College Withdrawal". Wilmington, N.C.: UNC Wilmington, 1986. ED274929.

Beal, P. E. and Noel, L. What Works in Student Retention. Iowa City: American College Testing Program and The National Center for Higher Education Management Systems, 1980.

Bean, John P. "Conceptual Models of Student Attrition: How Theory Can Help the Institutional Researcher" in E. Pascarella, ed., New Directions for Institutional Research: Studying Student Attrition, no. 36. San Francisco: Jossey-Bass, December 1982.

Coker, Richard. Institutional Retention Study: Gainesville Junior College. Gainesville, Ga.: Gainesville Jr. College, 1985.

Cope, R. G. and Hannah, W. Revolving College Doors: The Causes and Consequences of Dropping Out, Stopping Out, and Transferring. New York: Wiley, 1975.

Durkheim, E. Suicide. Translated by J. Spaulding and C. Simpson. Glencoe, Il.: The Free Press, 1961.

Endo, Jean and Bittner, Terry. "Developing and Using a Longitudinal Student Outcomes Data File: The University of Colorado Experience" in P. T. Ewell, ed., New Directions For Educational Research: Assessing Educational Outcomes, No. 47. San Francisco: Jossey-Bass, 1985.

Ewell, Peter T. Student-Outcomes Questionnaires: An Implementation Handbook, Second Edition. Boulder: National Center for Higher Education Management Systems (NCHEMS), 1983.

Ewell, Peter T. "Principles of Longitudinal Enrollment Analysis: Conducting Retention and Student Flow Studies" in Muffo, John A. and McLaughlin, Gerald W., eds., A Primer on Institutional Research. Tallahassee: Association for Institutional Research (AIR), pp. 1-19, 1987.

Ewell, Peter T., Parker, Ronald and Jones, Dennis P. Establishing a Longitudinal Student Tracking System: An Implementation Handbook. Boulder: NCHEMS, 1988, (draft).

Gallaudet Research Institute, "Patterns of Student Attrition at Gallaudet College: Fall 1984 to Fall 1985". Washington: Gallaudet College, August 1986.

Lenning, Oscar T. "Variable-Selection and Measurement Concerns" in E. Pascarella, ed., New Directions for Institutional Research: Studying Student Attrition, no. 36. San Francisco: Jossey-Bass, December 1982.

Levitz, Randi and Noel, Lee. "Using a Systematic Approach to Assessing Retention Needs" in Noel, Levitz and Saluri, eds., Increasing Student Retention: Effective Programs and Practices for Reducing the Dropout

Rate, pp. 448-467. San Francisco: Jossey-Bass, 1985.

Noel, Lee, Levitz, Randi S. and Saluri, Diana. "Getting Retention Results: A Blueprint for Action" in Noel, Levitz and Saluri, eds., Increasing Student Retention: Effective Programs and Practices for Reducing the Dropout Rate, pp. 448-467. San Francisco: Jossey-Bass, 1985.

Pascarella, Ernest T. "Student-Faculty Informal Contact and College Outcomes" in Review of Educational Research, Vol 50, pp. 545-595, 1980.

Pascarella, Ernest T. and Chapman, David W. "A Multiinstitutional, Path Analytic Validation of Tinto's Model of College Withdrawal" in American Educational Research Journal, Vol. 20, No. 1, pp. 87-102 Spring 1983.

Pascarella, Ernest T., Duby, P. B., Iverson, B. "A Test and Reconceptualization of a Theoretical Model of College Withdrawal in a Commuter Institution Setting" in Sociology of Education Vol 56, No. 1, pp. 88-100. Washington: American Sociological Association, 1983.

Pascarella, Ernest T., Smart, John C. and Ethington, Corinna A. "Long Term Persistence of Two-Year College Students" in Research in Higher Education, Vol. 24, No. 1, pp. 47-71. New York: Agathon Press, 1986.

Spady, W. "Dropouts From Higher Education: An Interdisciplinary Review and Synthesis" in Interchange, V. I, pp. 64-85, 1970.

Terenzini, Patrick T. "An Evaluation of Three Basic Designs for Studying Attrition" in Journal of College Student Personnel, V. 21 No.3, pp. 257-63, May 1980.

Terenzini, P. T. and Pascarella, Ernest T. "A Path Analytic Validation of Tinto's Theory of College Student Attrition". Paper presented at the annual American Educational Research Association, Montreal, May 1983.

Terenzini, P. T. "Studying Student Attrition and Retention" in Muffo, John A. and McLaughlin, Gerald W., eds., A Primer on Institutional Research. Tallahassee: Association for Institutional Research (AIR), pp. 20-35, 1987.

Tinto, Vincent. "Dropout From Higher Education: A Theoretical Synthesis of Recent Research" in Review of Educational Research, Vol. 45, No. 1, pp. 89-125, 1975.

Tinto, Vincent. "Theories of Student Departure Revisited" in Smart, John C. ed., Higher Education: Handbook of Theory and Research, V. II. New York: Agathon Press, Inc., 1986.

Tinto, Vincent. Leaving College: Rethinking the Causes of College Attrition. Chicago: University of Chicago Press, 1987.

Voorhees, Richard A. "Toward Building Models of Community College Persistence" in Research in Higher Education, Vol. 26, No.2, pp. 115-129. New York: Agathon Press, 1987.

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